

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of the Claims

What is claimed is:

1. (Original) A method for mechanically assisting the pumping action of the heart, comprising the steps of :
 - providing a catheter comprising an elongate member having a proximal end, a distal region, the catheter further comprising an expandable member attached in the distal region and an inflatable member in the distal region and attached distal the expandable member, the catheter further comprising a lumen that communicates with the inflatable member and extends proximally;
 - advancing the distal end of the catheter into the aorta;
 - expanding the expandable member to at least partially obstruct the aorta;
 - inflating the inflatable member during diastole; and
 - deflating the inflatable member during the ejection phase of the left ventricle, wherein the pumping action of the heart is mechanically assisted.
2. (Original) The method of claim 1, wherein the inflatable member has a volume of between 10–30 cc.
3. (Original) The method of claim 1, wherein the expandable member is maintained in an expanded state during systole and diastole.

4. (Original) The method of claim 1, wherein the expandable member is cycled between an expanded state and a contracted state.

5. (Original) The method of claim 1, wherein the expandable member is expanded before inflating the inflatable member, and wherein the expandable member is contracted after deflating the inflatable member.

6. (Original) The method of claim 1, further comprising the steps of repeating the steps of inflating the inflatable member and deflating the inflatable member.

7. (Original) The method of claim 5, further comprising the steps of repeating the steps of inflating the inflatable member and deflating the inflatable member.

8. (Original) The method of claim 1, wherein the catheter is placed so that the inflatable member and the expandable member are positioned in the descending aorta.

9. (Original) The method of claim 1, wherein the inflatable member is inflated with carbon dioxide.

10. (Original) The method of claim 1, wherein the expandable member is a balloon.

11. (Original) The method of claim 10, wherein the balloon is expanded by filling with saline.

12. (Original) The method of claim 10, wherein the balloon is expanded by filling with carbon dioxide.

13. (Original) The method of claim 1, wherein the expandable member is expanded to fully obstruct the aorta.

14. (Original) The method of claim 1, wherein the expandable member is expanded to partially obstruct the aorta.

15. (Original) The method of claim 1, further comprising the steps of measuring an electrocardiogram and synchronizing inflation with the R wave of the electrocardiogram, so that maximum inflation occurs at the peak of the T wave, and deflation is timed to occur just before the next QRS complex of the electrocardiogram.

16. (Original) The method of claim 1, wherein cerebral blood flow is augmented by the combined action of the inflatable member and the expandable member.

17-21. (Cancelled)

22. (Original) A catheter for mechanically assisting the pumping action of the heart, comprising:

an elongate tubular member having a proximal end, a distal end, and a distal region;

a first balloon attached to the elongate tubular member at the distal region and communicating with a first inflation lumen that extends proximally from the first balloon;

a second balloon attached to the elongate tubular member at the distal region distal the first balloon and communicating with a second inflation lumen that extends proximally from the second balloon, the second balloon having an inflation volume of 10–30 cc;

a first blood pressure measuring mechanism for measuring blood pressure between the first balloon and the second balloon; and

a second blood pressure measuring mechanism for measuring blood pressure upstream the second balloon,

wherein, during use, the first balloon is inflated and the second balloon is inflated during diastole and deflated during the ejection phase of the left ventricle to mechanically assist the pumping action of the heart.

23-28. (Cancelled)

29. A method for mechanically assisting the pumping action of the heart, comprising the steps of:

providing a catheter having a proximal end, a distal end, a distal region, a first balloon attached in the distal region, a second balloon attached in the distal region distal the first balloon, and a third balloon attached in the distal region distal the second balloon;

advancing the distal end of the catheter into the aorta;

sequentially inflating the first balloon, the second balloon, and the third balloon during diastole, to propagate blood flow retrograde to the coronary arteries and the carotid arteries; and

sequentially deflating the third balloon, the second balloon, and the first balloon during the ejection phase of the left ventricle to propagate blood flow antegrade, wherein the pumping action of the heart is mechanically assisted.

30-39. (Cancelled)

40. (Original) A catheter for mechanically assisting the pumping action of the heart, comprising:

an elongate tubular member having a proximal end, a distal end, a distal region, and a lumen extending from the proximal end to the distal region;

a first balloon attached to the elongate tubular member at the distal region and communicating with a first inflation lumen that extends proximally from the first balloon;

a second balloon attached to the elongate tubular member at the distal region distal the first balloon and communicating with a second inflation lumen that extends proximally from the second balloon, the second balloon having an inflation volume of 10–30 cc;

a third balloon attached to the elongate tubular member at the distal region and distal the second balloon and communicating with a third inflation lumen that extends proximally from the third balloon, the third balloon having an inflation volume of 10–30 cc; and

a blood pressure measuring mechanism for measuring blood pressure upstream of the third balloon,

wherein, during use, the first, second, and third balloons are sequentially inflated during diastole to propagate blood flow retrograde to the coronary arteries and the carotid arteries, and the third, second, and first balloons are sequentially deflated during the ejection phase of the left ventricle to propagate blood flow antegrade and mechanically assist the pumping action of the heart.

41-48. (Cancelled)

49. (Original) A method for mechanically assisting the pumping action of the heart, comprising the steps of :

providing a catheter comprising an elongate member having a proximal end, a distal region, the catheter further comprising an expandable member attached in the distal region and an inflatable member in the distal region and attached proximal the expandable member, the catheter further comprising a lumen that communicates with the inflatable member and extends proximally;

inserting the catheter into a subclavian artery;

advancing the distal end of the catheter into the aorta;

expanding the expandable member to at least partially obstruct the aorta;

inflating the inflatable member during diastole; and

deflating the inflatable member during the ejection phase of the left ventricle, wherein the pumping action of the heart is mechanically assisted.

50-73. (Cancelled)